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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/520,618

01/10/2005

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EXAMINER

ENIN-OKUT, EDU E

ART UNIT

PAPER NUMBER

4132

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/520,618	Applicant(s) AOKI ET AL.	
	Examiner Edu E. Enin-Okut	Art Unit 4132	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/10/05</u> . | 6) <input checked="" type="checkbox"/> Other: <u>See Continuation Sheet</u> . |

Continuation of Attachment(s) 6). Other: Online translation of JP 2000-123850..

DETAILED ACTION

Priority

1. Acknowledgment is made of Applicant's claim for foreign priority to Japanese Patent Application No. JP 2002-201083, filed on July 10, 2002, under 35 U.S.C. 119(a)-(d). A certified copy of that application has been received.

Specification

2. The incorporation of essential material in the specification by reference to a foreign application, Japanese Patent Application No. JP 2002-201083, on p. 12, line 26 – p. 13, line 1, is improper. Applicant is required to amend the disclosure to include the material incorporated by reference, if the material is relied upon to overcome any objection, rejection, or other requirement imposed by the Office. The amendment must be accompanied by a statement executed by the applicant, or a practitioner representing the applicant, stating that the material being inserted is the material previously incorporated by reference and that the amendment contains no new matter. 37 CFR 1.57(f).

Claim Objections

3. Claims 3-4 are objected to because of the following informalities:

- Claim 3 recites "... without reaching the outlet manifold ..." on the eighth line of the claim.

It appears that this phrase should be --without reaching the *inlet* manifold--.

- Claim 4 recites "... the an outlet manifold side end face ..." on the second line of the claim.

It appears that this should be --*an* outlet manifold side end face--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claims 5-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Both claim 5 and 6 recites the limitation “the fibers”. There is insufficient antecedent basis for this limitation in the claim. (Examiner’s Note: It appears the affected portions of the claim should be phrased as “... the numerical density of fibers in the ...”.)

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Kinoshita (Japanese Patent No. 2000-123850; cited in IDS).

With regard to claim 1, Kinoshita discloses a fuel cell (Title), comprising:

- a solid polymer electrolyte membrane [1] (para. 1; Fig. 2);
- a catalyst electrode layer [3] disposed on the solid polymer electrolyte membrane (para. 11, 14; Fig. 2);
- a gas diffusion layer [4,5] disposed on the catalyst electrode layer (para. 13; Fig. 2); and
- a separator [8] disposed on the gas diffusion layer and forming an inlet manifold and outlet manifold between the electrolyte membrane (para. 14; Fig. 2), wherein:
 - one surface of the gas diffusion layer faces the inlet manifold, and the other surface of the gas diffusion layer faces the outlet manifold, the inlet manifold and outlet manifold being partitioned by the gas diffusion layer (Fig. 2);

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- and gas flows from the one surface facing the inlet manifold and into the gas diffusion layer, flows through the interior of the gas diffusion layer, and flows out from the other surface facing the outlet manifold (para. 3; Fig. 2).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita as applied to claim 1 above.

Kinoshita is applied and incorporated herein for the reasons above.

Regarding claim 2, Kinoshita discloses the claimed invention except for the width of the gas diffusion layer in a direction perpendicular to the laminar direction of the cells is formed larger than the distance between the one surface and the other surface.

It would have been an obvious matter of design choice to use the gas diffusion layer of Kinoshita having dimensions as recited in claim 2 in a fuel cell, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. See MPEP 2144.04 (IV).

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11. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita as applied to claims 1 above, further in view of Wilson (U.S. Patent No. 5,641,586).

Kinoshita is applied and incorporated herein for the reasons above.

Regarding claim 3, Kinoshita discloses that the gas diffusion layer [4] comprises a high transmission region [areas with carbon paper present] and a low transmission region [areas where carbon paper is not present] having a smaller gas transmission factor than the high transmission region; the inlet high transmission region and the outlet high transmission region being disposed at a certain distance apart; and, the low transmission region is a remaining region apart from the high transmission region of the gas diffusion layer (para. 13; Fig. 2).

However, Kinoshita does not disclose that the high transmission region comprises an inlet high transmission region extending from the one surface toward the outlet manifold *without* reaching the outlet manifold, and an outlet high transmission region extending from the other surface toward the inlet manifold *without* reaching the inlet manifold.

Wilson teaches a polymer electrolyte membrane fuel cell with a macroporous flow-field 56 with interdigitated inlet and outlet reactant channels 64,66 that contacts the a side of a gas diffusion layer for distributing gaseous reactants over that layer for transport to the catalytic surfaces of the membrane (Abstract; 3:58-4:2; Fig. 2). The interdigitated channels can be formed within the macroporous flow field (e.g., flow-field 44) (4:5-7; Fig. 1C). The macroporous flow field may be formed from a carbon paper or foam, sintered particles, and woven and non-woven metal screens (4:48-53, 5:10-12). The reference also teaches that the macroporous flow field may be used in fuel cell without the inclusion of a gas diffusion layer (6:66-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to orient the high transmission regions of the gas diffusion layer of Kinoshita in manner in which these regions form interdigitated channels, as taught by Wilson, in order to reduce pressure drop

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through the flow field (see Wilson, 1:66-67), provide uniform distribution of fuel cell reactants to electrodes (see Wilson, 4:1-2), and, in turn, improve cell performance.

12. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita and Wilson as applied to claim 3 above.

Kinoshita and Wilson are applied and incorporated herein for the reasons above.

Regarding claim 4, neither Kinoshita nor Wilson expressly teach that the distance between an outlet manifold side end face of the inlet high transmission region and an inlet manifold side end face of the outlet high transmission region, is longer than the distance between the inlet high transmission region and outlet high transmission region.

However, it has been held that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (e.g., *In Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984) cert. denied, 469 U.S. 830, 225 USPQ 232 (1984)). See MPEP 2144.04 (IV).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the gas diffusion layer of Kinoshita, as modified by Wilson, the layer having dimensions as recited in claim 4, for the reasons described in the discussion of claim 3 above.

13. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita and Wilson as applied to claim 3 above, further in view of Yoshida et al. (European Patent Application No. 1 298 745 A2).

Kinoshita and Wilson are applied and incorporated herein for the reasons above.

Regarding claim 5, neither Kinoshita nor Wilson expressly teaches that the numerical density of the fibers in the high transmission region is smaller than the numerical density of the fibers in the low transmission region.

Yoshida teaches that a fuel cell has a diffusion layer 60,70 with regions of differing pore density and, in turn, rates of gas diffusion, created by varying the number and diameter of fibers in those regions 60a-60b,70a-70b (para. 32-34, 65, 70-71, 93, 96; Figs. 6-7). A first and second mesh regions of the diffusion layer have a fine and coarse mesh, and higher and lower number of threads in those areas, respectively (para. 22, 70-71). The second mesh regions can also have threads of a larger diameter than that of the first region (para. 71).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to, as taught by Yoshida, vary the numerical density of fibers between the high and low transmission regions of the diffusion layer of Kinoshita, as modified by Wilson, to tailor the movement of media through the diffusion layer of a fuel cell (see Yoshida, Abstract).

Regarding claim 6, the limitations recited in this claim have been addressed above with respect to claim 5.

14. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita as applied to claim 3 above, further in view of Yoshida et al. and Trapp et al. (International Publication No. WO 10/04980).

Kinoshita, Wilson and Yoshida are applied and incorporated herein for the reasons above.

Regarding claim 7, Yoshida teaches that in the high transmission regions, fibers are arranged in a direction perpendicular to the surface of the gas diffusion layer in contact with the manifold (para. 11).

However, Kinoshita, Wilson and Yoshida do not expressly teach that, in the low transmission region, fibers are arranged in a direction parallel to the surface of the gas diffusion layer in contact with the manifold.

Trapp teaches electrode substrates for electrochemical cells where graphitized fibers in a web structure (e.g., a woven cloth) are mainly aligned perpendicular to the planar direction of a fuel cell resulting in high transmission through-plane conductivity (Abstract; p. 5, lines 2-6; p. 5, lines 35-36).

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Thus, it would have been obvious to one ordinary skill in the art at the time of the invention to perpendicularly orient fibers as taught by Trapp in the high transmission region of the gas diffusion layer of Kinoshita, as modified by Wilson, to ensure high through-plane conductivity of gases through those regions.

Correspondence / Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edu E. Enin-Okut whose telephone number is 571-270-3075. The examiner can normally be reached on Monday-Thursday, 8 a.m. - 4 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward, can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edu E. Enin-Okut/
Examiner, Art Unit 4132

/Jessica L. Ward/
Supervisory Patent Examiner, Art Unit 4132

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